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TSCA HEALTH & SAFETY STUDY COVER SHEET - revised 6/25/96

TSCA CBI STATUS:

☐ CHECK IF THIS PAGE CONTAINS CONFIDENTIAL BUSINESS INFORMATION (CBI)

Clearly mark the confidential information with bracketing and check the box in the appropriate section (☐ Contains CBI). Submit a sanitized cover sheet with CBI deleted. Mark the sanitized copy, "Public Display Copy" in the heading.

1.0 SUBMISSION TYPE ☐ Contains CBI

☐ 8(d) ● 8(a) ☐ FYI ☐ 4 ☐ OTHER: Specify 8EHQ-0698-14188S

● Initial Submission ☐ Follow-up Submission ☐ Final Report Submission

Previous EPA Submission Number or Title if update or follow-up: Docket Number, if any: #

☐ continuation sheet attached

2.1 SUMMARY/ABSTRACT ATTACHED (may be required for 8(e); optional for §4, 8(d) & FYI)	2.2 SUBMITTER TRACKING NUMBER OR INTERNAL ID	2.3 FOR EPA USE ONLY
● YES ☐ NO		

3.0 CHEMICAL/TEST SUBSTANCE IDENTITY ☐ Contains CBI

CAS# 363-72-4

Purity 99.9 %

☐ Single Ingredient

☐ Commerical/Tech Grade

☐ Mixture

Reported Chemical Name (specify nomenclature if other than CAS name):

Pentafluorobenzene

Trade Name: PFB Common Name

Other chemical(s) present in tested mixture	CAS Number	NAME	% WEIGHT
		Water	0.1%

☐ continuation sheet attached

4.0 REPORT/STUDY TITLE ☐ Contains CBI

Twenty-Eight-Day Repeated-dose Oral Toxicity Study of PFB in Rats

☐ continuation sheet attached

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5.1 STUDY/TSCATS INDEXING TERMS

[CHECK ONE]

HEALTH EFFECTS (HE): HE ENVIRONMENTAL EFFECTS (EE): ENVIRONMENTAL FATE (EF):

5.2 STUDY/TSCATS INDEXING TERMS (see instructions for 4 digit codes)

STUDY TYPE: STOX Other:

SUBJECT ORGANISM (HE, EE only): RATS Other:

ROUTE OF EXPOSURE (HE only): ORAL Other:

VEHICLE OF EXPOSURE (HE only) Other: Olive Oil

6.0 REPORT/STUDY INFORMATION ● Contains CBI ● Study is GLP

Laboratory Report/Study

Date

Source of Data/Study Sponsor (if different than submitter) Number of pages

☐ continuation sheet attached

7.0 SUBMITTER INFORMATION ● Contains CBI

Submitter: S. Dawn Mattox Title: Env./Safety Engr. Phone: 423-624-6496

Company Name: N.A. Industries, Inc. Company Address: 2651 Riverport Rd.

Chattanooga, TN 37406 Submitter Address (if different): N/A

Technical Contact: S. Dawn Mattox Phone: 423-624-6496

☐ continuation sheet attached

8.0 ADDITIONAL/OPTIONAL STUDY COMMENTS ☐ Contains CBI

● continuation sheet attached

Page 1 of 10 Submitter Signature: Date: 5-13-98

8EHQ-98-14188

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COMPANY SANITIZED

	LIST OF ATTACHMENTS	Attachment page number(s)	Confidential
1	**2.1 SUMMARY/ABSTRACT ATTATHED**	3-4	X
2	8.0 ADDITIONAL/OPTIONAL STUDY COMMENTS **:Continuation sheet attached** List of Study and Regal Status of PFB	5	X
3	8.0 ADDITIONAL/OPTIONAL STUDY COMMENTS **:Continuation sheet attached** Summary of "Chromosomal Aberration Test of PFB Using Cultured Mammalian Cells".	6	X
4	Material Safety Data Sheet(MSDS)	7-10	X

SUMMARY

A 28-day repeated-dose oral toxicity study of PFB followed by a 14-day recovery test was conducted in the Crj:CD (SD) rats (6/sex/group), 5-weeks-old at the start of dosing. Dose levels were 640, 160, 40 and 8 mg/kg/day. Recovery groups were separately provided for the 640, 160 mg/kg/day and vehicle control groups.

In this study, there were no deaths associated with the test substance treatment. No abnormalities were noted in hematological examinations and urinalysis at the end of the dosing period.

In clinical signs, treatment-related changes included decreased spontaneous locomotion, salivation, whitish region in the incisors (160 and 640 mg/kg/day males and females), decreased respiration rate, lids closure (160 and 640 mg/kg/day males and 640 mg/kg/day females), lacrimation, unkempt hair, defect of the lower incisor tips, irregular surface of the lower incisors (640 mg/kg/day males and females), reddish tear (640 mg/kg/day males), diarrhea, staining around the nose and mouth, staining on the lower abdomen, moist hair on the chest, abdomen and around the anus, and loss of hair on the femur (640 mg/kg/day females). The abnormalities of the incisors were observed for weeks 3-4 at the 640 mg/kg/day level and week 4 at the 160 mg/kg/day level. Decreases or trends toward decreases in body weights were noted in the 160 mg/kg/day males for days 15-28 and in the 640 mg/kg/day males for days 3-28. In food consumption, a decrease in food consumption was noted in the 640 mg/kg/day males and in the 160 and 640 mg/kg/day females on study day 4. At terminal examinations, an increase in total birilubin level, a decrease in potassium level (640 mg/kg/day males), a decrease in cholinesterase level, increases in total choresterol, total protein and albumin levels (640 mg/kg/day females), and trends toward increases in GPT levels (640 mg/kg/day males and females) were noted. In organ weights, an increase in liver weight (160 and 640 mg/kg/day females and 640 mg/kg/day males) and increases in kidney weights (640 mg/kg/day males) were noted. In necropsy, whitish region in the incisor (160 and 640 mg/kg/day males and females), defect of the incisor tip, irregular surface of the incisor (640 mg/kg/day males and females), enlargement of the liver (160 and 640 mg/kg/day females and 640 mg/kg/day males) and brownish change of the liver (640 mg/kg/day females) were observed. In histopathological examinations, decreased iron pigments of the ameloblasts, irregular alignment, degeneration and loss of the ameloblasts at the maturation stage, necrosis and cell infiltration of the pulp,

proliferation of the papillary layer (640 mg/kg/day males and females), ground glass appearance and prominent nuclei of the hepatocytes (160 and 640 mg/kg/day males), and centrilobular swelling of the hepatocytes (160 and 640 mg/kg/day females and 640 mg/kg/day males) were noted.

In the recovery test, abnormalities of the incisors observed in the treatment period and overgrown upper incisors were noted in the 640 mg/kg/day males at daily examinations, and the incidence or degree of the changes of incisors were increased in necropsy and histopathological examination. Decreased iron pigments, irregular alignment, degeneration and loss of the ameloblasts at the maturation stage, proliferation of the papillary layer (160 mg/kg/day males), and partial loss of the incisor (640 mg/kg/day males and females) were also noted in histopathological examinations. In body weights, a trend toward decrease in body weight (160 mg/kg/day males) and a decrease or a trend toward decrease in body weight (640 mg/kg/day males) were noted. In food consumption, a decrease or a trend toward decrease in food consumption were noted in the 640 mg/kg/day males and females. A trend toward increase in GPT level was noted in the 640 mg/kg/day males. In clinical signs, loss of hair on the femur continued to be observed in one male of the 640 mg/kg/day group. Increases in organ weights and hypertrophy of the cortex in the adrenal glands, decreases in mean cell volume and reticulocyte counts (160 and 640 mg/kg/day males), increases in red blood cell and platelet counts, a decrease in triglyceride level, and increases in blood urea nitrogen and chloride levels (640 mg/kg/day males) were noted.

Based upon the results of this study, the NOEL (no-observed-effect-level) of PFB for rat was considered to be 40 mg/kg/day.

Study Director:

Takaaki Umano

Takaaki Umano, M.S., D.V.M.

March 31, 1998

Date

Continuation Sheet of "8.0 ADDTIONAL/OPTIONAL STUDY COMMENTS"

Study and Regal Status of PFB

1 Study

STUDY	RESULTS	METHODS	LABORATORY
CORROSIVE AND IRRITANT PROPERTIES Primary eyes irritation test in rabbits	No irritation	OECD 405 GLP	
CORROSIVE AND IRRITANT PROPERTIES Primary skin irritation test in rabbits	Slightly irritation	OECD 404 GLP	
ACUTE TOXICITY: RATS	LD50: 2000mg/kg≦	OECD 401 GLP	
BIODEGRADABILITY	Not biodegradable	GLP[3)]	
PARTITION COEFFICIENT n-Octanol/Water	log Po/w 2.42	GLP[3)]	
DISSOCIATION CONSTANT	Not dissociation	GLP[3)]	
Mutagenicity test Reverse-mutation assay in bacteria	Negative	GLP[3)]	
Twenty-eight-day Repeated-dose oral Toxicity Study of PFB in Rats.	NOEL 40mg/kg/day	GLP[3)]	
Mutagenicity test Chromosomal aberration test in cultured mammalian cells(CHL cells)	Positive (Metabolic activation method) D_{20} 13 mg/ml.	GLP[3)]	

3)Test method : According to Law Concerning the Examination and Regulation of Manufacture, etc., of Chemical Substances Japan.

2 Regal status of PFB (Pentafluorobenzene) in US(TSCA), EU, and Japan

US(TSCA)	ON TSCA INVENTORY (CA RN363-72-4)
EU	EINECS No.206-658-7
JAPAN	
CANADA	NDSL
KOREA	ECL Serial No.3-2994

SUMMARY

The ability of PFB to induce chromosomal aberration was examined using Chinese hamster lung fibroblasts (CHL cells) under the conditions in which S9 mix was both not added (direct method) and added (metabolic activation method).

On the basis of the results of cell growth inhibition tests and cell division inhibition tests, chromosomal aberration tests were carried out at 500, 1,580 and 5,000 μg/ml in 24 and 48-h treatment groups using the direct method, and 1,250, 2,500 and 5,000 μg/ml in the groups with and without S9 using the metabolic activation method.

Numerical aberration slightly increased in 48-h treatment group by direct method. Reproducibility of this result was confirmed by the reexamination test with the same doses. Chromosomal aberration was not induced in the group with S9 mix by the metabolic activation method, which did not coincide with the results of dose determination test. Therefore, the reexamination test was carried out with the same doses. As a result, structural aberration did not increase and the reproducibility of the result was confirmed. Accordingly the test substance was judged to induce no structural aberration.

On the other hand, in positive control groups, a significant induction of chromosomal aberration was observed following treatment with MMC and CPA.

Based on the above results, PFB is considered to induce chromosomal aberrations under the conditions of the present study.

The value of D_{20} for numerical aberration was calculated to be 13,000 μg/ml for the 48-h treatment group by the direct method.

Study Director:

Syozo Ajimi

Syozo Ajimi, B.S.

March 31, 1998

Date

MATERIAL SAFETY DATA SHEET

DATE PREPARED:14.Feb.1996
DATE REVISED :09.Apl.1998

1.CHEMICAL PRODUCT & COMPANY IDENTIFICATION

- **CHEMICAL PRODUCT NAME : PFB**
- **NAME OF MANUFACTURER**
- **ADDRESS**

- **TEL No.**
- **FAX N o.**
- **EMERGENCY TEL No.**

2.COMPOSITION/INFORMATION ON INGREDIENTS

- **SUBSTANCE/MIXTURE** : Substance
- **CHEMICAL NAME** : Pentafluorobenzene
- **SYNONYMS** : —
- **CAS REGISTRY NUMBER** : 363-72-4
- **INGREDIENTS AND COMPOSITION** : More Than 99%
- **CHEMICAL FORMULA** : C_6HF_5
- **UN CLASS** : 3.2 (Flammable liquids ; Middle flash point)
- **UN No.** : 1993 (P.G.2)

3.HAZARD IDENTIFICATION

- **CLASS NAME OF HAZARDOUS CHEMICALS FOR MSDS IN JAPAN:** Flammable liquids
- **PHYSICAL AND CHEMICAL HAZARDS:**

Highly flammable liquids.
Contact with strong acids or bases may form toxic stench.
During a fire, this substance decompose and may liberate toxic fumes. (Halogen gases, COx.)
Contact with bases may form fluorine salts. Contact of the salts with strong acids may liberate irritating, highly toxic and corrosive HF.

- **ADVERSE HUMAN HEALTH EFFECTS:**

Slightly irritating to the skin. This substance is believed to present very little hazard if swallowed. May cause irritating to respiratory tract.
Possible risk of irreversible effects to teeth by repeated oral dose.

- **ENVIRONMENTAL EFFECTS:**

This substance is not biodegradable. This substance is low bioaccumulation.

4.FIRST-AID MEASURES

- **EYE CONTACT :**

First rinse with plenty of water for several minutes(remove contact lenses if easily possible), then take to a doctor.

- **SKIN CONTACT:**

Immediately flush skin with plenty of water. Remove clothing. Get medical attention immediately.

·**INHALATION :**

Remove to flesh air. If not breathing, give artificial respiration. If breathing difficult, give oxygen. Get immediate medical attention.

·**INGESTION :**

If swallows, do not induce vomiting. Give victim a glass of water. Call physician immediately.
Never give anything by mouth to an unconscious person.

5.FIRE-FIGHTING MEASURES

·**EXTINGUISHING MEDIA:**

Use alcohol foam, carbon dioxide, powder, or water spray.

·**SPECIFIC HAZARDS WITH REGARD TO FIRE-FIGHTING MEASURES:**

Evacuate area and fight fire from safe distance.
Firefighters should wear self-contained breathing apparatus with full face peace operated in positive pressure mode.
During a fire, this substance decompose and may liberate toxic fumes. (Halogen gases, COx.)

6.ACCIDENTAL RELEASE MEASURES

Evacuate non essential personnel. Shut off all sources of ignition. No flares, smoking or flames in area. Collect leaking and spilled liquid in sealable containers as far as possible. Do not let this chemical enter the environment. Wear suitable protective equipment.

7.HANDLING & STORAGE

·**HANDLING:**

Wash thoroughly after handling. Avoid contact with eyes, skin and clothing. Use only in a well-ventilated area. Use spark-proof tools and explosion-proof equipment. Do not breathe vapor or mist. Do not reuse container. Prevent build-up of electrostatic charges(e. g. grounding).

·**STORAGE :**

Keep container closed with not in use. Do not store in direct sunlight. Keep away from heat and flame. Separated from strong oxidants.

8.EXPOSURE CONTROL/PERSONAL PROTECTION

·**CONTROL PARAMETERS:**

CHEMICAL NAME	CAS RN	ACGIH TWA (1996-1997)	OSHA(1997)	%100.0 (by wt.)
Pentafluoro-benzene	363-72-4	Not established	Not established	More than 99%

·**ENGINEERING MEASURES :**

Facilities storing or utilizing this substance should be equipped with an eyewash facility and a safety shower. Use process enclosures, local exhaust ventilation, or other engineering controls.

·**PERSONAL PROTECTIVE EQUIPMENT:**

RESPIRATORY PROTECTION : Chemical cartridge respirator with an organic vapor cartridge. Positive-pressure self-contained breathing apparatus.
EYE PROTECTION : Wear safety glasses with side shields or goggles and a face shield.
HANDS, SKIN AND BODY PROTECTION:
Where contact is likely, wear chemical resistance gloves, a chemical suit, rubber boots.

9.PHYSICAL & CHEMICAL PROPERTIES

- **PHYSICAL STATE, FORM :** Liquid
- **APPEARANCE :** Colorless liquid
- **DENSITY** : 1.514[1)]
- **BOILING POINT** : 85℃[2)]
- **MELTING POINT** : -48℃[1)]
- **ODOUR** : Characterisitic
- **VAPOUR PRESSURE :** Not applicable
- **SOLUBILITY :** Insoluble in water . Soluble in toluene or acetone

10.PHYSICAL HAZARD(STABILITY & REACTIVITY)

- **FLASH POINT** : 13℃[1)] (Closed cup)
- **AUTOIGNITION TEMPERATURE** : Not available.
- **UPPER AND LOWER EXPLOSION LIMIT** : Not available.
- **FLAMMABILITY** : Flammable.
- **SPONTANEOUS COMBUSTIBILITY** : Not applicable.
- **REACTIVITY WITH WATER** : This substance is not reactive with water.
- **OXIDIZIBILITY** : This substance is not oxidant.
- **SELF-REACTIVITY** : Not applicable.
- **PARTITION COEFFICIENT n-Octanol/Water:** log Po/w 2.42
- **DISSOCIATION CONSTANT** : Not dissociation
- **STABILITY & REACTIVITY:**

This substance is stable. Contact with bases may form fluorine salts. Contact of the salts with strong acids may liberate irritating, highly toxic and corrosive HF.
Incompatible with strong oxidants.

- **HAZARDOUS DECOMPOSITION PRODUCTS :**

When heated to decomposition it exits toxic gases. (Halogen gases, CO_X)

11.TOXICOLOGICAL INFORMATION

- **CORROSIVE AND IRRITANT PROPERTIES :**

Primary skin irritation test in rabbits : Slightly irritation.[3)]
Primary eye irritation test in rabbits : No irritation[3)]

- **ALLERGENIC AND SENSITIVE EFFECTS** : No information.
- **ACUTE TOXICITY** : oral-rat LD_{50} : 2000mg/kg≦[3)]
- **SUB-CHRONIC TOXICITY** : No information.
- **CHRONIC TOXICITY** : No information.
- **CARCINOGENIC EFFECTS** : Not established on IRCA, NTP, EU, OSHA.
- **MUTAGENIC EFFECTS** : This substance was negative in the Ames test.[3)]

This substance was positive in the chromosomal aberration test with or without S9 mix by metabolic activation method. D_{20} values was 13 mg/ml.[3)]

- **SUB-CHRONIC TOXICITY :** A 28-day repeated-dose oral toxicity study in rats ; No-observed effects level was 40 mg/kg/day.
The 28-day repeated-dose caused neurogenic symptoms, suppressed body weight gain and pathological changes of incisors, liver and blood chemistry parameters of rats in 160-640 mg/kg/day.
In the 14-day recovery test, abnormalities of incisors of male and female rats in 160-640 mg/kg/day were observed.[3)]

- **EFFECTS ON THE REPRODUCTIVE** : No information.
- **TERATOGENIC EFFECTS** : No information.
- **HAZARDOUS DECOMPOSITION PRODUCTS :**

When heated to decomposition it emits toxic fumes. (Halogen gases, COx)

12.ECOLOGICAL INFORMATION

·**BIODEGRABILITY** : This substance is not biodegradable.[3)]

·**BIOACCUMULATION** : This substance is not bioaccumlatable.[3)]

(Partition Coefficient N-Octanol/Water; Log Po/W 2.42
Dissociation Constant; Not Dissociation)

13.DISPOSAL CONSIDERATION

Burn in a chemical incinerator equipped with an afterburner and scrubber. Do not dump into sewers, on the ground or into any body or water. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity or other sources of ignition. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner, or properly disposed of.

Adequate disposal are recommended, as toxic HF gas may liberate upon combustion.

14.TRANSPORT INFORMATION

Any transportation practice must be in compliance with laws and regulation in your country or region.

15.REGULATORY INFORMATION

·**US status**

TSCA Inventory : Listed
SARA TITLE 3 313 : Not listed

·**EU STATUS**

EINECS : No. 206-658-7

·**Korea**

ECL : Serial No. 3-2994

·**Regulatory information with regard to this substance in your country or region should be examined by your own responsibility.**

16.OTHER INFORMATION

·**REFERENCES:**1)Catalog Handbook of Fine Chemicals 1996-1997(Aldrich).
2)These data are measured by
3)Achieved by testing institute.

·**To the best of our knowledge, the information contained herein is accurate. However, neither nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we can-not guarantee that these are the only hazards which exist.**